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Kohyama et al.

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[54] **IMAGE FORMING APPARATUS INCLUDING A CLEANING BLADE AND DRUM LUBRICANT**

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[51] **Int. Cl.**[3] **G03G 21/00**; F16N 15/00; B05C 11/105; E21B 10/22

[52] **U.S. Cl.** ..... **355/15**; 355/3 FU; 118/652; 184/99; 310/228

[58] **Field of Search** ..... 15/256.53, 256.51, 256.52; 355/15, 3 FU; 118/652, 653; 430/125; 184/10, 99; 310/228

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[57] **ABSTRACT**

An image forming apparatus comprises a rotatable photosensitive drum driving mechanism for rotating the photosensitive drum; and a cleaning blade which is capable of being in contact with the outer circumferential surface of the photosensitive drum and which removes a residual developer on the outer circumferential surface upon contact therewith.

A recess is formed at part of the outer circumferential surface and holds lubricant therein; and the tip end of the cleaning blade feeds the lubricant in the recess to part of the outer circumferential surface of the photosensitive drum which is brought into contact with the cleaning blade to form a thin film of the lubricant upon contacting with the lubricant held in the recess as said photosensitive drum is rotated.

13 Claims, 9 Drawing Figures

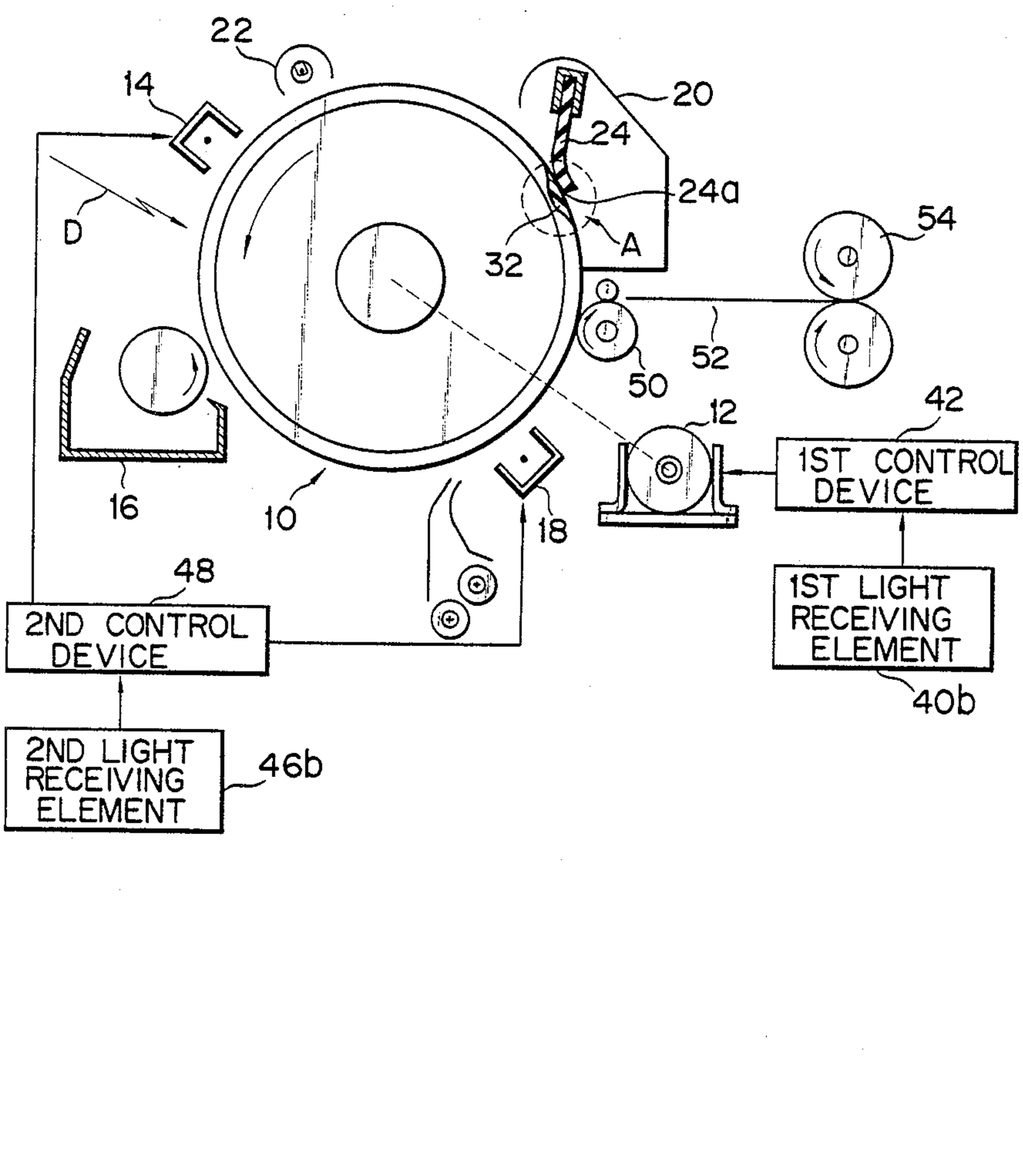

FIG. 1

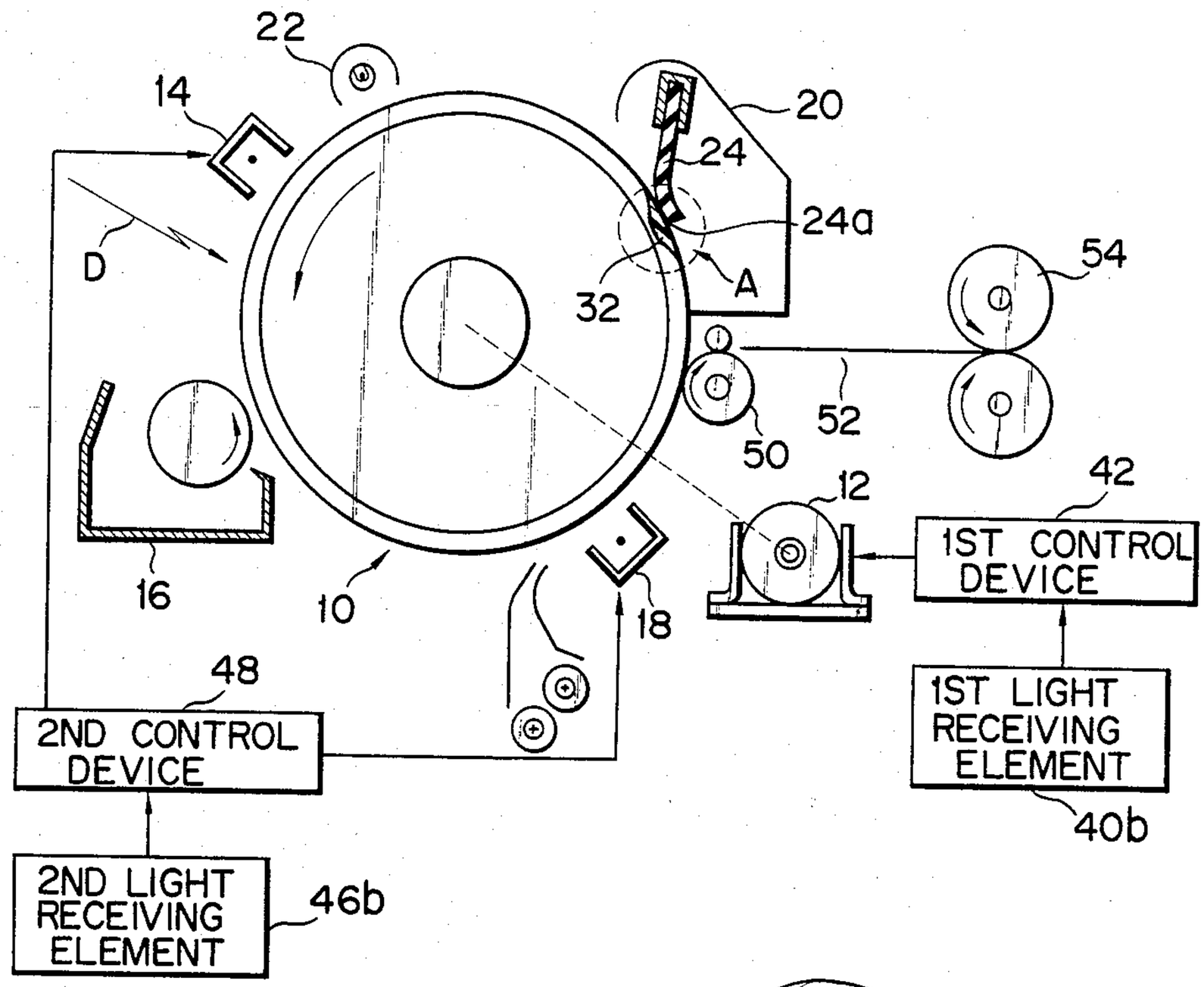
22
14
20
24
24a
D
A
32
54
52
50
12
42
1ST CONTROL DEVICE
16
10
18
48
2ND CONTROL DEVICE
1ST LIGHT RECEIVING ELEMENT
40b
2ND LIGHT RECEIVING ELEMENT
46b

FIG. 2

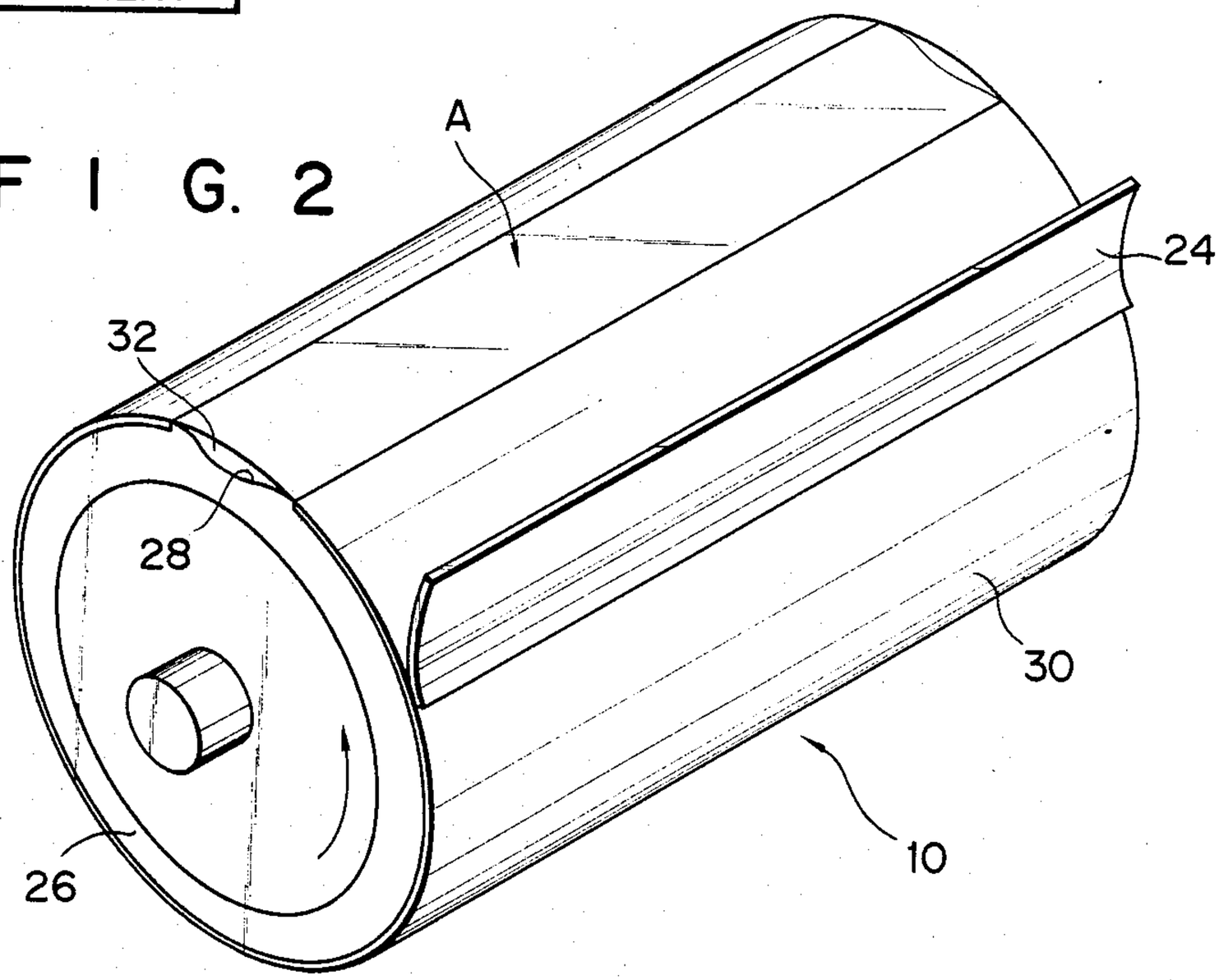
A
24
32
28
30
26
10

FIG. 3

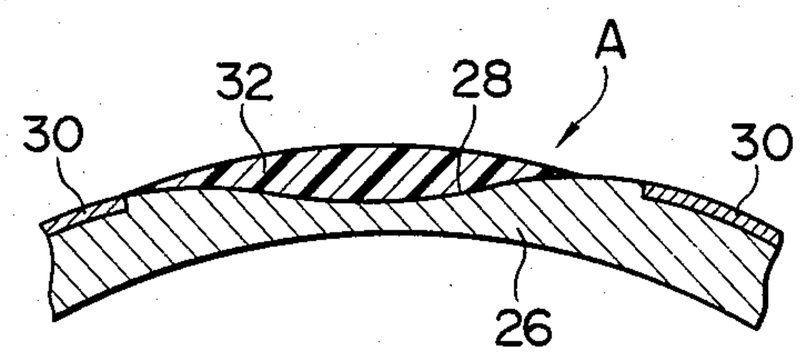

FIG. 4

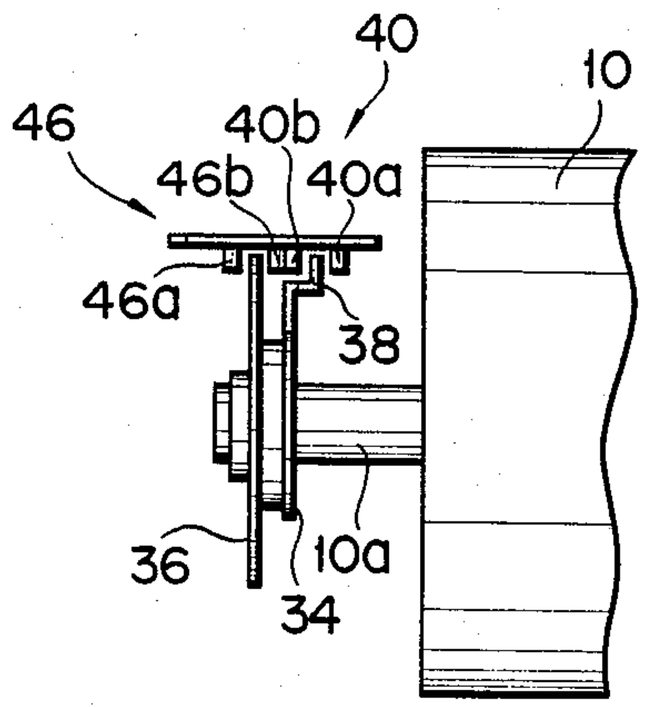

FIG. 5

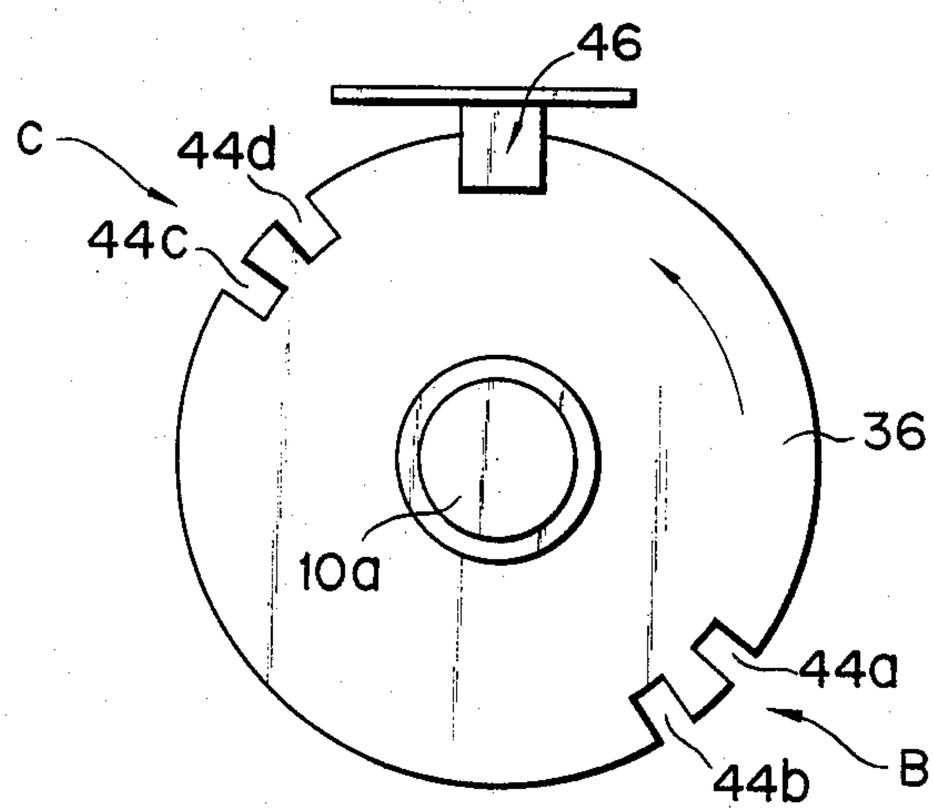

FIG. 6

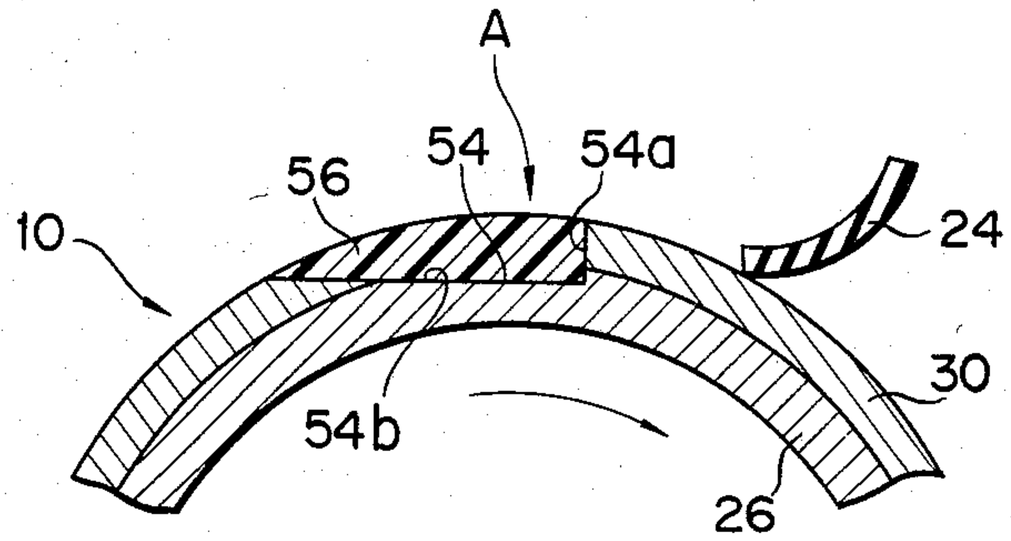

FIG. 7

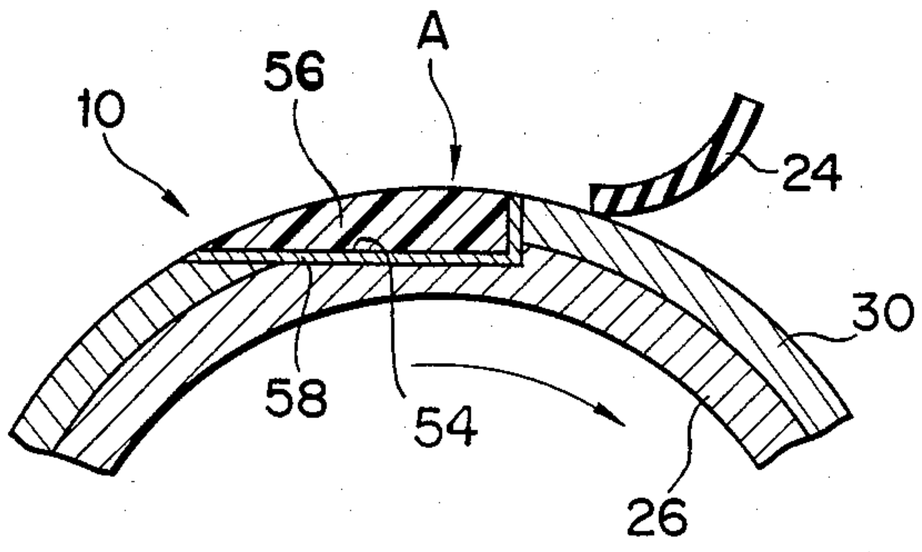

FIG. 8

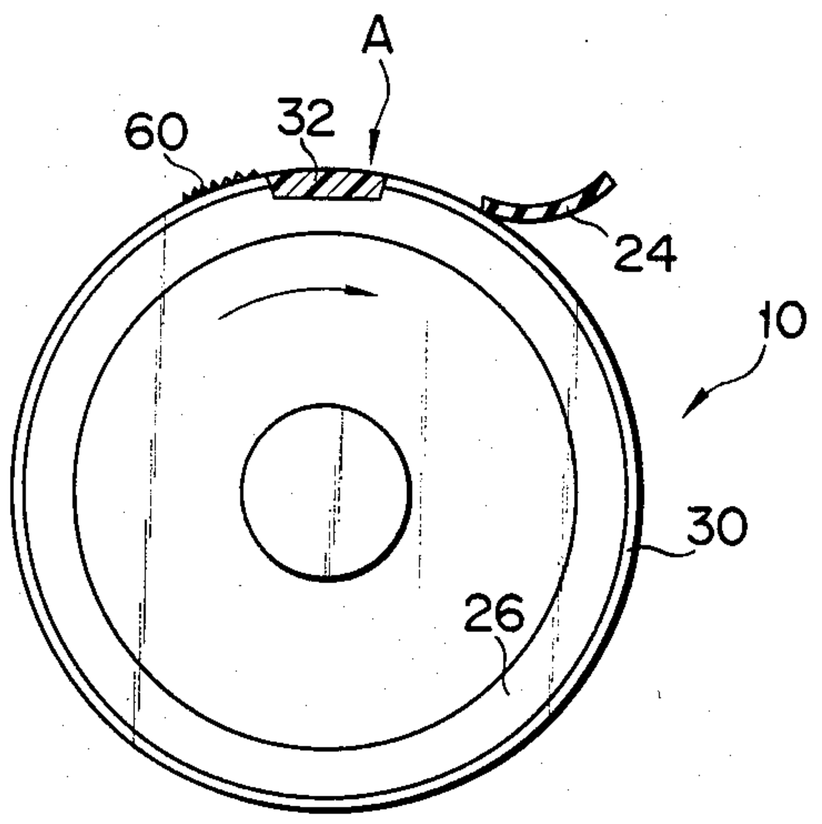

FIG. 9

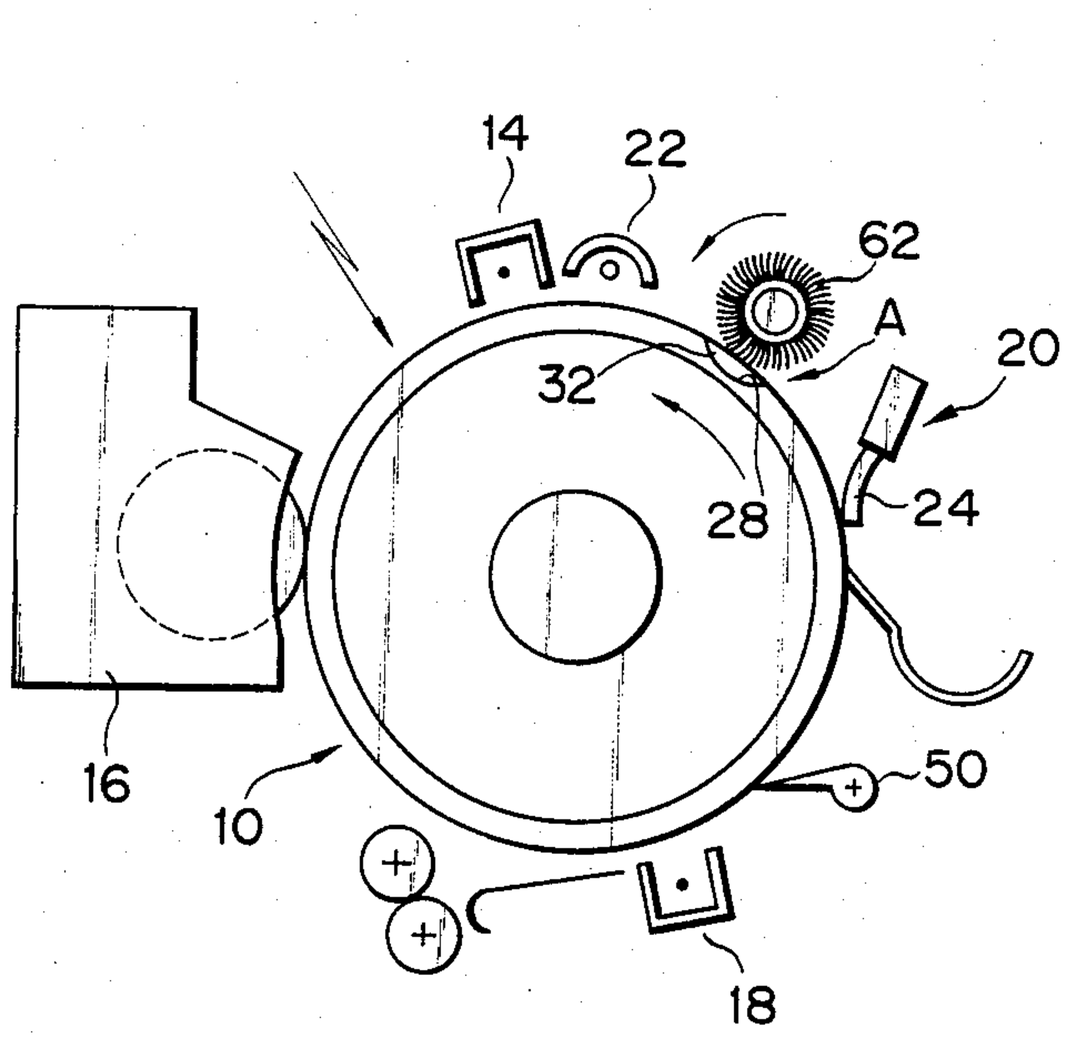

IMAGE FORMING APPARATUS INCLUDING A CLEANING BLADE AND DRUM LUBRICANT

BACKGROUND OF THE INVENTION

The present invention relates to an image forming apparatus which has a photosensitive body for forming an electrostatic latent image thereon and which visualizes the image with a developer and, more particularly, to an image forming apparatus which cleans with a cleaning blade the residual developer on the surface of a photosensitive body.

In an image forming apparatus such as an electrostatic copying apparatus, a nontransferred toner remaining on the surface of a photosensitive drum is generally scraped off with a cleaning blade to clean the photosensitive drum.

If a relatively great frictional force acts between the photosensitive drum and the cleaning blade, the surface of the photosensitive drum may be damaged or filming of the toner may result; stress acting on the blade may deteriorate the desired contact state to cause turning-up; and, static electricity generated by friction results in non-uniform surface potential in the charging step, which, in turn, causes an irregular image formation or fogging. In order to reduce the frictional force, the pressure of the cleaning blade may be reduced. However, if these measures are taken, the cleaning blade may not be able to function well for its original purpose, that is, cleaning, or the problem of filming may recur.

In order to reduce the frictional force acting between the cleaning blade and the photosensitive drum while maintaining a predetermined pressure of the cleaning blade, it has been conventionally proposed to add a lubricant such as wax to the toner. However, in this case, due to the presence of the lubricant in the toner, fixability of the toner may be degraded or filming may also be caused. This significantly degrades the image quality and renders this proposal impractical.

It has also been known to manually apply a lubricant such as wax on the surface of the photosensitive drum. However, no method has been proposed which is capable of maintaining the thickness of the lubricant film formed on the photosensitive drum for a long period of time within a range of below several hundred angstroms so as not to interfere with the electrostatic characteristics of the photosensitive drum. Attempts have also been made to construct the cleaning blade with a material having a low coefficient of friction. However, these attempts are also subject to the problem of degradation in other characteristics, especially mechanical strength, due to the addition of additives.

SUMMARY OF THE INVENTION

The present invention has been made in consideration of these problems and has for its object to provide an image forming apparatus which is simple in construction, and which is capable of reducing to the minimum the frictional force acting between a cleaning blade and a photosensitive body while maintaining the contact pressure between them at a predetermined level.

According to an aspect of the present invention, there is provided an image forming apparatus which comprises: a rotatable photosensitive body including an outer circumferential surface which has a recess for holding a lubricant therein at part thereof; driving means for rotating the photosensitive body; a cleaning blade which is capable of being in contact with the outer circumferential surface of the photosensitive body and which removes a residual developer on the outer circumferential surface upon contact therewith; and feeding means for feeding the lubricant held in the recess to part of the outer circumferential surface of the photosensitive body which is brought into contact with the cleaning blade to form a thin film of the lubricant upon contacting with the lubricant held in the recess as the photosensitive body is rotated.

If a lubricant is mixed with a developer, fixability of the developer is degraded and filming occurs. These problems are eliminated by the image forming apparatus of the present invention. The thickness of the lubricant film may be kept uniform, unlike the case wherein the lubricant is applied around the photosensitive body by hand. The mechanical strength of the cleaning blade may not be degraded and the frictional force acting between the photosensitive body and the cleaning body may be reduced to the minimum, unlike the case wherein the cleaning blade itself is made of a material having a low coefficient of friction.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic front view showing one embodiment of an image forming apparatus according to the present invention;

FIG. **2** is a perspective view showing a photosensitive drum shown in FIG. **1** together with a cleaning blade;

FIG. **3** is a sectional view showing a lubricant feeding section;

FIG. **4** is a side view showing two timing discs mounted on the photosensitive body;

FIG. **5** is a front view of the second timing disc;

FIG. **6** is a sectional view showing a first modification of the lubricant feeding section;

FIG. **7** is a sectional view showing a second modification of the lubricant feeding section;

FIG. **8** is a sectional view showing a third modification of the lubricant feeding section; and

FIG. **9** is a schematic front view showing another embodiment of an image forming apparatus according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

One embodiment of the present invention will now be described with reference to FIGS. **1** to **5** of the accompanying drawings.

Referring to FIG. **1**, a cylindrical photosensitive drum **10** is rotatably mounted inside an electrostatic copying apparatus as an image forming apparatus. The photosensitive drum **10** is driven by a motor **12** to rotate counterclockwise. A charger **14**, a developing unit **16**, a transfer unit **18**, a cleaning unit **20**, and a discharger **22** are sequentially arranged around the photosensitive drum **10** in the rotating direction thereof. The cleaning unit **20** has a fixed cleaning blade **24** which is in contact with the outer circumferential surface of the photosensitive drum **10** along the axial direction thereof. The cleaning blade **24** is made of a resilient polyurethane rubber and is urged against the surface of the photosensitive drum **10** under its resilient force.

The photosensitive drum **10** has a drum-shaped base **26**, as shown in FIG. **2**. A recess **28** constituting a lubricant feeding section A is formed on the outer circumferential surface of the base **26** along the axial direction

thereof. A photosensitive layer **30** is formed on the outer circumferential surface of the base **26** except for its part corresponding to the recess **28**. A lubricant **32** to be described later is held in the recess **28**. The recess **28** is defined by an arc-shaped curved surface smoothly extending from the outer circumferential surface of the base **26**, as shown in FIG. **3**. If a distal edge **24***a* of the cleaning blade **24** falls into the recess **28** with only little or no lubricant remaining therein, the distal edge **24***a* may not be damaged due to the curved contour of the recess **28**. The impact of fall of the cleaning blade **24** into the recess **28** may not be given to the photosensitive drum **10**. Therefore, undesired developing due to the asynchronous rotation of the photosensitive drum **10** may be prevented. The solid lubricant **32** may be a polypropylene-type resinous wax, carnauba wax, cotton wax, paraffin wax or stearic acid of a suitable hardness.

The driving operation of the motor **12** is electrically controlled so that the distal edge **24***a* of the cleaning blade **24** is brought into contact with the lubricant **32** held in the recess **28** when the photosensitive drum **10** is stationary. As shown in FIG. **4**, first and second timing discs **34** and **36** which are rotated synchronously with the rotation of the photosensitive drum **10** are coaxially mounted with a separation between them at one end of a support shaft **10***a* of the drum **10**. A projection **38** is formed to extend from the outer periphery of the first timing disc **34**, as shown in FIG. **4**. A first photocoupler **40** is arranged around the first timing disc **34**. The first photocoupler **40** has a first light-emitting element **40***a*, and a first light-receiving element **40***b* for receiving light emitted by the element **40***a*. The first light-receiving element **40***b* is connected to a first control device **42** which is, in turn, connected to the motor **12**.

When the first light-receiving element **40***b* receives light, it supplies a drive signal for the motor **12** to the first control device **42**. On the other hand, when the first light-receiving element **40***b* does not receive light, that is, when the projection **38** is located between the elements **40***a* and **40***b*, it supplies a stop signal for the motor **12** to the first control device **42**. The first timing disc **34** is so attached on the support shaft **10***b* that the projection **38** thereof may be located between the first light-emitting element **40***a* and the first light-receiving element **40***b* in the noncopying state.

At least four slits, first to four slits **44***a* to **44***d*, in this case, are formed on the outer periphery of the second timing disc **36**, as shown in FIG. **5**. The first and second slits **44***a* and **44***b* are formed adjacent to each other to make up a charge position detector B, while the third and fourth slits **44***c* and **44***d* are similarly formed adjacent to each other to make up a transfer position detector C. A second photocoupler **46** is arranged around the outer periphery of the second timing disc **36**, as shown in FIG. **4**. The second photocoupler **46** has a second light-emitting element **46***a*, and a second light-receiving element **46***b* for receiving light from the element **46***a*. The second light-receiving element **46***b* is connected to a second control device **48** which is, in turn, connected to the charger **14** and the transfer unit **18**.

The charge position detector B and the transfer position detector C are formed on the second timing disc **36** so that they are spaced apart from each other through an angular distance the same as that between the charger **14** and the transfer unit **18**. The second timing disc **36** is so fixed on the support shaft **10***a* that the charge position detector B may reach the second photocoupler **46** when the recess **28** of the photosensitive drum **10** opposes the charger **14**, and the transfer position detector C may reach the second photocoupler **46** when the recess **28** opposes the transfer unit **18**.

When the first slit **44***a* reaches the second photocoupler **46** to establish a light-receiving state of the second light-receiving element **46***b*, the second light-receiving element **46***b* supplies an OFF signal for the charger **14** to the second control device **48**. On the other hand, when the second slit **44***b* reaches the second photocoupler **46** to establish another light-receiving state of the second light-receiving element **46***b* the second light-receiving element **46***b* supplies an ON signal for the charger **14** to the second control device **48**. Further, when the third slit **44***c* reaches the second photocoupler **46** to establish still another light-receiving state of the second light-receiving element **46***b*, the second light-receiving element **46***b* supplies an OFF signal for the transfer unit **18** to the second control device **48**. When the fourth slit **44***d* reaches the second photocoupler **46** to establish still another light-receiving state of the second light-receiving element **46***b* the second light-receiving element **46***b* supplies an ON signal for the transfer unit **18** to the second control device **48**. The angle between the first and second slits **44***a* and **44***b* and that between the third and fourth slits **44***c* and **44***d* are set to equal that of both edges of the recess **28** along the outer circumference of the photosensitive drum **10**.

Referring to FIG. **1**, reference numeral **50** denotes a separation roller for separating a copying paper from the photosensitive drum **10**; **52**, a conveying path for the copying paper; and **54**, a fixing unit.

The mode of operation of the copying apparatus of the construction as described above will now be described. The photosensitive layer **30** of the photosensitive drum **10** is charged by the charger **14** while an original is illuminated with light from a light source (not shown). Light reflected from the original becomes incident on the surface of the photosensitive layer **30** as indicated by arrow D to form an electrostatic latent image corresponding to the image of the original. As the photosensitive drum **10** rotates, the electrostatic latent image formed thereon reaches the developing unit **16** to be visualized with a developer such as toner. The visualized image is transferred onto a copying paper by the transfer unit **18**. The copying paper with the transferred image thereon is separated from the photosensitive drum **10** by the separation roller **50**. Thereafter, the separated copying paper is fed to the fixing unit **54**, and the transferred image is fixed onto the copying paper. On the other hand, the residual toner on the photosensitive drum **10** which has not be transferred onto the copying paper is scraped off by the cleaning blade **24** of the cleaning unit **20**. The scraped toner is recovered to the developing unit **16**. The charge on the photosensitive drum **10** is discharged by the discharger **22** for the next copying cycle. In this manner, one copying cycle is completed.

Before one copying cycle is initiated, the cleaning blade **24** of the cleaning unit **20** is in contact with the lubricant **32** held in the recess **28** formed on the surface of the photosensitive drum **10**, so that a small amount of the lubricant **32** is constantly applied to the distal edge **24***a*. For this reason, the frictional force acting between the cleaning blade **24** and the surface of the photosensitive drum **10** is small, providing the same effects as a cleaning blade having a small coefficient of friction. As the photosensitive drum **10** rotates, the lubricant **32** applied onto the distal edge **24***a* of the cleaning blade **24**

is uniformly supplied over the entire outer circumferential surface of the drum **10** to form an extremely thin film of lubricant thereon. Due to the presence of this thin film of lubricant, the photosensitive drum **10** itself will also have a small coefficient of friction. The thin film of lubricant moreover serves as a protective film. In this manner, the lubricant is constantly present between the cleaning blade **24** and the photosensitive drum **10**, so that frictional stress acting therebetween may be significantly reduced.

The distal edge **24***a* of the cleaning blade **24** is formed with an edge precision of about 3 to 6 microns, and has a proper resiliency and a blade hardness of about 60° to 80°. Therefore, the film thickness of the lubricant **32** on the photosensitive layer **30** of the photosensitive drum **10** may be kept constant. Further, the film thickness of the lubricant may also be finely controlled by suitably selecting the hardness of the lubricant **32**, the contact pressure of the cleaning blade **24**, and so on. The thickness of the lubricant film formed on the photosensitive layer **30** tends to decrease as the hardness of the lubricant **32** increases, that is, the molecular weight thereof increases to several thousands to several hundred thousands and as the blade pressure (linear pressure) increases to 1.5 to 4.0 g/mm. The thickness of the lubricant film is hard to measure, in practice. However, if the blade pressure is 1.5 g/mm or less, the film thickness is assumed to be too great and deteriorates the image quality. The fact that a wax film of a non-uniform thickness is formed with the blade pressure being less than 1.5 g/mm may also be confirmed from irregular gloss on the surface of the photosensitive layer **30**. In summary, according to the one embodiment described above, an extremely thin film of the lubricant can be formed on the photosensitive layer **30**, and its thickness can be kept for a long period of time within a range such that the electrostatic characteristics of the photosensitive layer **30** may not be adversely affected.

According to the one embodiment described above, the lubricant **32** is fed to the cleaning blade **24** to form a uniform film thereof on the photosensitive layer **30**. The frictional stress acting between the photosensitive drum **10** and the cleaning blade **24** may be reduced to the minimum without interfering with the functions of either part. Conventional apparatuses are subject to various problems including turning up of the cleaning blade **24**, damage to the surface of the photosensitive layer **30** and filming, which are caused due to a great frictional stress acting between the cleaning blade **24** and the photosensitive drum **10**; degradation in the image quality due to static electricity resulting from friction between the cleaning blade **24** and the photosensitive drum **10**; or filming due to incomplete cleaning which results from a significant drop in the blade pressure for the purpose of reducing the frictional stress acting between the cleaning blade **24** and the photosensitive drum **10**. However, the copying apparatus according to the present invention avoids these drawbacks.

According to the one embodiment, the problem encountered in application of the lubricant **32** such as wax on the entire surface of the photosensitive layer **30**, that is, control of the film thickness (precision and uniformity) may also be eliminated. For this reason, factors which might adversely affect the electrostatic characteristics of the photosensitive drum **10** and which are encountered during application of the lubricant **32** may also be eliminated.

Since the lubricant **32** is fed to the cleaning blade **24** every time the photosensitive drum **10** rotates once, the advantageous effects as described above may be maintained for a long period of time until no more lubricant **32** is available.

Since the recess **28** for holding the lubricant **32** has an arc shape, the distal edge **24***a* of the cleaning blade **24** may not be damaged even if there is only little or no lubricant **32** remaining in the recess **28**. Accordingly, the copying machine may be used until no more lubricant **32** is available. Furthermore, the problem of shift in the position of the photosensitive drum **10** is eliminated which is caused by an impact which acts on it when the cleaning blade **24** passes over the lubricant feeding section A.

The **1**ubricant **32** used in the present invention is a semiconductor having a resistance of 10^6 to 10^{14} Ω·cm or a resistor having a high resistance and is held in an average depth of 0.5 to several mm. If the lubricant **32** is subject to charging by the charger **14** or the fixing unit **18** in this state, the surface of the lubricant **32** is charged and is then developed to degrade the image quality. However, according to the one embodiment, the charger **14** and the transfer unit **18** are electrically controlled through the second control device **48** so that the lubricant feeding section A may not be subject to charging. Therefore, the above problem is also prevented.

Irrespective of whether the photosensitive drum **10** is stationary or rotating, the cleaning blade **24** is in constant contact with the surface of the photosensitive drum **10**. When the photosensitive drum **10** is stationary, the cleaning blade **24** is in contact with the lubricant feeding section A. Therefore, the cleaning blade **24** may not be brought into contact with the image formation region of the photosensitive layer **30** and may not deform it when the photosensitive drum **10** is stationary. As a result of this, the cleaning blade **24** need not be spaced apart from the photosensitive layer **30** when the photosensitive drum **10** is stationary. Other problems of degradation in the image quality, contamination of the interior of the copying apparatus by toner, imprecise contact between the cleaning blade **24** and the photosensitive layer **30**, and the driving means of the cleaning blade **24** are also eliminated.

EXAMPLE

Photosensitive Material: Se
Wax: Polypropylene-type wax
Depth of recess: 1 mm
Cleaning blade: Polyurethane blade (74° hardness, 2 mm thickness, about 6 μ edge precision)

Using the materials as described above, 20,000 copies were produced with blade linear pressures of 2.0 and 4.0 g/mm acting on the photosensitive layer **30**, respectively. During the time period for reproducing these copies, no adverse effects on the image quality and electrostatic characteristics due to incorporation of the lubricant feeding part and application of the lubricant were observed, as may be seen from the table below.

Good results were obtained with respect to ease of cleaning, lack of filming on the photosensitive drum **10** and so on. Better results were also obtained with regard to damage to the photosensitive layer **30** and so on than with the conventional copying machine.

TABLE

	After Reproduction of 20,000 copies			
	Copying Apparatus of One Embodiment		Copying Machine of Prior Art	
	2.0 g/mm	4.0 g/mm	2.0 g/mm	4.0 g/mm
Filming	o	o	o	Δ By Blade Damage
Cleaning ability	o	o	o	Δ By Blade Damage
Electrostatic Characteristics	o	o	o	Δ Degradation Due To Scratches
Drum Scratch	o	o	Δ	x
Blade Outer Appearance	o	o	Δ	x

o: good
Δ: normal
x: bad

The present invention is not limited to the one embodiment described above. For example, FIG. **6** shows a first modification wherein the lubricant feeding section A comprises a recess **54** formed in the outer circumferential surface of the drum **10**. The recess **54** is defined by a first flat surface **54***a* extending toward the center of the drum **10** and a second flat surface **54***b* perpendicular thereto. A solid lubricant **56** is held within the recess **54**. According to the first modification, the solid lubricant **56** may not be inadvertently removed from the drum **10**. The solid lubricant **56** may be inserted into the recess **54** from the end surface of the photosensitive drum **10**, improving the serviceability such as exchange of the solid lubricant **56**. The second flat surface **54***b* of the recess **54** is formed along the outer circumferential surface of the photosensitive drum **10** so as to reduce an impact which may act upon contact with the cleaning blade **24**.

FIG. **7** shows a second modification wherein a lubricant support plate **58** for fixing the lubricant **56** in the recess **54** is arranged. The support plate **58** is arranged tightly inside the recess **54** so as to facilitate serviceability and exchangeability of the lubricant **56**.

FIG. **8** shows a third modification wherein a plurality of small projections **60**, of 20 to 100 microns size are arranged behind the lubricant feeding section A of the photosensitive drum **10** along the rotating direction thereof. According to the third modification, the amount of the lubricant **32** attached to the cleaning blade **24** may be more precisely controlled.

It is also possible to prevent removal of the lubricant **32** from the recess **28** by forming indentation at the interface between the recess **28** and the lubricant **32** which is shown in FIG. **3**..

Depending upon the type of lubricant used, the lubricant **32** may function until the lifetime of the drum expires.

As described above, the cleaning blade **24** can be used as a feeding means for the lubricant **32** or **56**. However, the present invention is not limited to this construction. FIG. **9** shows another embodiment which uses a cylindrical brush **62** for feeding the lubricant **32**. The reference numerals shown in FIG. **9** which are common with those shown in FIGS. **1–8**, denote the same members, and, thus, descriptions thereof have been omitted. The cylindrical brush **62** as a feeding means of the lubricant **32** rotates in contact with that portion of the outer circumferential surface of the photosensitive drum **10** which is between the cleaning blade **24** and the discharger **22**. The thickness of the lubricant film formed on the photosensitive drum **10** may be controlled according to selection of hardness, length, rotational frequency and so on of the brush.

What we claim is:

1. An image forming apparatus comprising:

a rotatable photosensitive body including an outer circumferential surface having a recess for holding a lubricant therein at a part thereof, said recess being formed to extend from one side to the other side of said outer circumferential surface;

driving means for rotating said photosensitive body;

a cleaning blade for removing a residual developer on said outer circumferential surface upon contact therewith, said cleaning blade having an edge portion which extends from said one side to said the other side of said outer circumferential surface, said edge portion being in contact with said outer circumferential surface of said photosensitive body, said cleaning blade being capable of falling into said recess; and

feeding means for feeding any lubricant held in the recess to part of the outer circumferential surface of said photosensitive body which is brought into contact with said cleaning blade to form a thin film of lubricant upon contacting with any lubricant held in said recess as said photosensitive body is rotated.

2. The apparatus according to claim **1**, wherein said recess extends parallel to a rotating axis of said photosensitive body.

3. The apparatus according to claim **1**, wherein said recess comprises a bottom surface extending smoothly from said outer circumferential surface.

4. The apparatus according to claim **3**, wherein said bottom surface has an arc-shaped curved surface portion.

5. The apparatus according to claim **1**, wherein said driving means includes: a motor for driving said photosensitive body; and first controlling means, connected to said motor, for stopping said photosensitive body in a position to oppose said recess in a noncopying state.

6. The apparatus according to claim **5**, wherein said cleaning blade is constantly urged against said outer circumferential surface of said photosensitive body at a predetermined pressure.

7. The apparatus according to claim **1**, wherein said feeding means includes said edge portion of said cleaning blade.

8. The apparatus according to claim **1**, wherein said feeding means includes:

a rotatable brush roller which is, upon rotation of said photosensitive body, brought into contact with the lubricant held in said recess to feed the lubricant to said part of said photosensitive body which is brought into contact with said cleaning blade and to form a thin film of the lubricant.

9. The apparatus according to claim **8**, which further comprises:

charging means, arranged around said outer circumferential surface of said photosensitive body, for charging said outer circumferential surface; and

second controlling means, connected to said charging, for stopping operation thereof when said recess reaches a position to oppose said charging means.

10. An image forming apparatus comprising:

a rotatable photosensitive body including an outer circumferential surface having a recess for holding a lubricant therein at a part thereof;

driving means for rotating said photosensitive body;

a cleaning blade which is capable of being in contact with said outer circumferential surface of said photosensitive body and which removes a residual developer on said outer circumferential surface upon contact therewith;

feeding means comprising a rotatable brush roller, which is, upon rotation of said photosensitive body, brought into contact with any lubricant held in the recess to feed lubricant to said part of the outer circumferential surface of said photosensitive body which is brought into contact with said cleaning blade to form a thin film of lubricant;

charging means, arranged around said outer circumferential surface of said photosensitive body, for charging said outer circumferential surface; and

controlling means, connected to said charging means, for stopping operation thereof when said recess reaches a position to oppose said charging means.

11. The apparatus according to claim **10**, which further comprises:

transferring means, arranged around said outer circumferential surface of said photosensitive body, for transferring a toner image formed on said outer circumferential surface onto a copying paper; and

wherein said controlling means is connected to said transferring means, for stopping operation thereof when said recess reaches a position to oppose said transferring means.

12. An image forming apparatus comprising:

a rotatable photosensitive body including an outer circumferential surface having a recess for holding a lubricant therein at a part thereof;

driving means for rotating said photosensitive body;

a cleaning blade which is capable of being in contact with said outer circumferential surface of said photosensitive body and which removes a residual developer on said outer circumferential surface upon contact therewith;

feeding means for feeding any lubricant held in the recess to part of the outer circumferential surface of said photosensitive body which is brought into contact with said cleaning blade to form a thin film of lubricant upon contacting with any lubricant held in said recess as said photosensitive body is rotated;

charging means, arranged around said outer circumferential surface of said photosensitive body, for charging said outer circumferential surface; and

controlling means, connected to said charging means, for stopping operation thereof when said recess reaches a position to oppose said charging means.

13. The apparatus according to claim **12**, which further comprises:

transferring means, arranged around said outer circumferential surface of said photosensitive body, for transferring a toner image formed on said outer circumferential surface onto a copying paper; and

wherein said controlling means is connected to said transferring means, for stopping operation thereof when said recess reaches a position to oppose said transferring means.

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